

Letter of Interest

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During my adolescent years, my father would always have me work on projects with him to improve and/or fix our home. The most inspiring project he had was to find a way to keep the water level on a nearby pond maximized during dry summers. After months of research, building and experimenting, I was able to create a waterwheel-pump to transport water from an artesian well up a gradient which supplied the needed water. At the age of sixteen, my project's abstract was published in *The Ohio Journal of Science* Vol.111 No. 1 March 2011.

I am currently studying Physics at Purdue University with the intent to use my education to improve the quality of life. My interests, for the time being, are focused on material sciences and metamaterials. Many materials have ways of being improved; likewise, many materials are yet to be discovered; and for this reason, it is important to find ways of producing newer, stronger and more efficient materials, as well as finding applications for new discoveries made in this field. Recently, an article published in *Nature Photonics*, titled "Experimental realization of an epsilon-near-zero metamaterial at visible wavelengths," explains how layered Ag/SiN-metamaterial gives visible light a nearly infinite wavelength. This particular breakthrough could lead to "more efficient LED and optic devices". There are advancements like this being made at a steady rate and my goal is to be part of a team that is able to make these discoveries and find applications for said discoveries; however, in order to achieve this goal, I will require further education.

I have been working under the supervision of Dr. David Sederberg on a project, which when completed, will help mimic how changing a material's atomic structure will lead to different macroscopic properties. This project is planned to be turned into a lab that high school students will be able to test, thus giving them insight on nano-science topics as well as material science topics. As of date, I have been able to find ways to consistently produce thin polymer sheets, made of polyvinyl alcohol (PVA), as well as find ways to introduce new binding agents to strengthen the films. This project has helped me gain more insight on how it is possible to use experiments that occur on the micro-scale and scale them up to be tangible, macro-scale, products.

Once this project is complete, I am going to seek a research opportunity in a metamaterial or material science lab. When I applied to the College of Science at Purdue, I received the Ascarelli scholarship for Physics Research. I have been waiting to use this award until I had a larger science background, thus allowing me to benefit more from an undergraduate research position. Currently, I am a first semester sophomore in the physics program, but by the end of my junior year, I will have more experience in my field of interest.

In summary: I am interested in material science. As of now, I do not have a specific field within this field, but by the time I graduate I will have a better idea. If given the opportunity to further my education, I will be able to acquire the necessary background to get closer to achieving my goal.